National Institute of Environmental Health Sciences

Multi-criteria decision analysis tools for prioritising emerging or re-emerging infectious diseases associated with climate change in Canada

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Year: 2013
Journal: PLoS One. 8 (8): e68338

Abstract:

Global climate change is known to result in the emergence or re-emergence of some infectious diseases. Reliable methods to identify the infectious diseases of humans and animals and that are most likely to be influenced by climate are therefore required. Since different priorities will affect the decision to address a particular pathogen threat, decision makers need a standardised method of prioritisation. Ranking methods and Multi-Criteria Decision approaches provide such a standardised method and were employed here to design two different pathogen prioritisation tools. The opinion of 64 experts was elicited to assess the importance of 40 criteria that could be used to prioritise emerging infectious diseases of humans and animals in Canada. A weight was calculated for each criterion according to the expert opinion. Attributes were defined for each criterion as a transparent and repeatable method of measurement. Two different Multi-Criteria Decision Analysis tools were tested, both of which used an additive aggregation approach. These were an Excel spreadsheet tool and a tool developed in software 'M-MACBETH'. The tools were trialed on nine 'test' pathogens. Two different methods of criteria weighting were compared, one using fixed weighting values, the other using probability distributions to account for uncertainty and variation in expert opinion. The ranking of the nine pathogens varied according to the weighting method that was used. In both tools, using both weighting methods, the diseases that tended to rank the highest were West Nile virus, Giardiasis and Chagas, while Coccidioidomycosis tended to rank the lowest. Both tools are a simple and user friendly approach to prioritising pathogens according to climate change by including explicit scoring of 40 criteria and incorporating weighting methods based on expert opinion. They provide a dynamic interactive method that can help to identify pathogens for which a full risk assessment should be pursued.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3737372

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Security, Precipitation, Temperature

Food/Water Security: Livestock Productivity

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Non-U.S. North America

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease, Respiratory Effect, Other Health Impact

Infectious Disease: Airborne Disease, Foodborne/Waterborne Disease, Vectorborne Disease, Zoonotic Disease

Airborne Disease: Blastomycosis, Coccidioidomycosis (Valley Fever)

Foodborne/Waterborne Disease: Cholera, Giardiasis

Vectorborne Disease: Fly-borne Disease, Mosquito-borne Disease, Tick-borne Disease

Fly-borne Disease: Trypanosomiasis

Mosquito-borne Disease: Chikungunya, Dengue, Rift Valley Fever, West Nile Virus

Tick-borne Disease: Lyme Disease

Zoonotic Disease: Hantavirus Pulmonary Syndrome

Respiratory Effect: Bronchitis/Pneumonia

Other Health Impact: Foot and mouth disease

Medical Community Engagement:

resource focus on how the medical community discusses or acts to address health impacts of climate change

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified